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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/734,100

12/11/2003

Paul R. McHugh

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EXAMINER

WILKINS III, HARRY D

ART UNIT

PAPER NUMBER

1753

MAIL DATE

DELIVERY MODE

08/08/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/734,100

Applicant(s)

MCHUGH ET AL.

Examiner

Harry D. Wilkins, III

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-14,17-23,25-28 and 40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 40 is/are allowed.
- 6) ☒ Claim(s) 1,3-14,17-20,22,23 and 25-28 is/are rejected.
- 7) ☒ Claim(s) 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/8, 6/11, 6/27/07.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Status

1. The rejection of claims under 35 USC, 112, 2nd paragraph have been withdrawn in view of Applicant's amendments.
2. Due to Applicant's various amendments to the claims, all previous grounds of rejection are withdrawn unless they are expressly set forth again below.

Prior Art

3. As noted in the Information Disclosure Statement and Declaration of Thomas L. Ritzdorf, Keigler et al (US 2005/0167275) has been expressly admitted as prior art against the present application.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 18-20, 22, 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broadbent (US 6,027,631) with reference to Patton et al (US 6,156,167, incorporated by reference within Broadbent at col. 3, lines 44-50) in view of Keigler et al (US 2005/0167275).

Broadbent teaches (see abstract and figures 1-10 and Patton et al, figures 1-25) a system for processing workpieces (104 of Broadbent) including a vessel (43 of Patton et al) for containing an electrolyte and having a process location positioned to receive

the workpiece, the process location having a center, an electrode support (67 of Patton et al) positioned to carry an electrode in fluid communication with the process location, a workpiece support (33 of Patton et al) being positioned to carry the workpiece at the process location and an electric field control element (shield 110 of Broadbent) positioned along a flow path between the electrode support and the process location. The shield was configured to control an electrical current density in the electrolyte at the process location such that at a given radius from the center of the process location, there were (at least) two points having different current densities.

However, Broadbent does not disclose or suggest including a paddle device as claimed, and thus, would also fail to teach the electric field control element generally aligned with the motion axis or paddle axis of the paddle device.

Keigler et al teach (see abstract, figures 10-18 and paragraphs 87-116) use of a paddle device arranged adjacent a workpiece surface, wherein the paddle device had multiple paddles elongated along a paddle axis and movable relative to the process location along a motion axis transverse to the paddle axis. Keigler et al teach (see paragraphs 7-8 and 52) that by controlling the fluid flow at the workpiece surface, improved deposition of a film on the workpiece surface is achieved, including high purity, uniform thickness and uniform electrical properties of the plated film.

Therefore, it would have been obvious to one of ordinary skill in the art to have added the paddle device of Keigler et al to the system of Broadbent for the known purpose of improving the deposition of the film on the workpiece surface. It would have

been within the expected ability of one of ordinary skill in the art to have chosen to arrange the paddle between the shield and the anode (claim 23).

Regarding the fact that the current density was higher at a portion of the process location generally aligned with the motion axis, than at a portion of the process location generally aligned with the paddle axis, the shield of Broadbent controls the electric field such that the current density is lower where the shield is and higher where it isn't. Thus, aligning the shield along a portion of the processing location aligned with the paddle axis results in the claimed relationship of current density. As noted below, Broadbent teaches that various aspects of the shield were known to be result effective, including shape. Thus, it would have been within the ability of one of ordinary skill in the art to have arranged the shape in such a manner to achieve the presently claimed current density relationship.

Regarding claims 19 and 20, Broadbent teaches (see col. 7, line 47 to col. 8, line 4) that various shapes were acceptable for the electric field control element (shield 110) including a solid plate with holes or slots.

Regarding claim 22, Broadbent teaches (see paragraph spanning cols. 3 and 4) that the shield may be attached by use of a mechanical collar. In that instance, the shield would be considered a gasket clamped between two portions.

Regarding claim 25, the shield of Broadbent has a zero flow-through area where it is positioned and a full flow-through area where it is not positioned. Thus, the shield meets the feature that it has a first flow-through area in regions aligned with the paddle

axis and a second flow-through area greater than the first in regions aligned with the motion axis.

6. Claims 1, 3-5, 10-12 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Keigler (US 2005/0167275).

Woodruff et al teach (see figures 4-6) a system for processing microfeature workpieces including a vessel configured to receive a processing fluid, the vessel having a process location positioned at a process plane to receive a microfeature workpiece and a workpiece support positioned to carry a microfeature workpiece face-down in a generally horizontal orientation at the process location of the vessel during processing, the workpiece support being movable (see figure 3 and paragraph 48) relative to the vessel between a load/unload position and a process position. Woodruff et al teach (see paragraph 72) that the individual electrodes (600a-d) can be independently controlled. Thus, the outermost electrode 600d can be controlled to operate as a thieving electrode in fluid communication with the process plane, with the thieving electrode being positioned along a flow path that includes a virtual thief location (VE₄) spaced apart from the process plane.

Thus, Woodruff et al fail to teach a paddle device as claimed.

Keigler et al teach (see abstract, figures 10-18 and paragraphs 87-116) use of a paddle device arranged adjacent a workpiece surface, wherein the paddle device had multiple paddles elongated along a paddle axis and movable relative to the process location along a motion axis transverse to the paddle axis. Keigler et al teach (see

paragraphs 7-8 and 52) that by controlling the fluid flow at the workpiece surface, improved deposition of a film on the workpiece surface is achieved, including high purity, uniform thickness and uniform electrical properties of the plated film.

Therefore, it would have been obvious to one of ordinary skill in the art to have added the paddle device of Keigler et al to the system of Woodruff et al for the known purpose of improving the deposition of the film on the workpiece surface.

Regarding claim 3, the workpiece support of Woodruff et al included a contact electrode to make electrical contact with the workpiece, at least one anode (600a-c) spaced apart from the process location and one or more power supplies coupled among the contact electrode, the thieving electrode (600d) and the at least one anode (600a-c) and controllable to apply a higher potential to the at least one anode (600a-c).

Regarding claim 4, the electrode support included a plurality of electrode chambers separated from each other by dielectric walls, with gaps between the walls forming a corresponding plurality of virtual electrode locations spaced apart from the process location.

Regarding claim 5, the paddle would have been arranged in a "paddle chamber" inside the vessel between the electrode support and the process location.

Regarding claim 10, Woodruff et al teach (see figures 4-6) an electrode support (530+510) as claimed.

Regarding claim 11, Woodruff et al teach (see figures 4-6) including multiple electrodes 600a-d disposed in the corresponding electrode chambers.

Regarding claim 12, the plurality of electrodes disclosed by Woodruff et al are capable of operation independent of each other, even at opposite polarities. Thus, any one of the electrodes (600) of Woodruff et al would have been capable of operating as an electrode thief.

Regarding claim 26, as above, Woodruff et al teach the vessel and workpiece support as claimed and Keigler et al provide the requisite motivation to further add a paddle device to the system of Woodruff et al.

Regarding claim 27, Keigler et al teach a plurality of paddles having spaced apart paddle surfaces.

7. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Keigler et al (US 2005/0167275) as applied above to claims 1, 3-5, 10-12 and 27-28 and further in view of Reid et al (US 6,214,193).

The teachings of Woodruff et al and Keigler et al are described above.

Woodruff et al and Keigler et al fail to teach a nozzle as claimed.

Reid et al teach (see figure 1) a system for processing workpieces ('W') including a vessel (112) configured to receive a first processing fluid and having a process plane for the workpiece, a workpiece support (190) positioned to carry a workpiece at the process plane and a nozzle (160) able of coupling to a source of a second processing fluid positioned above the process plane to direct a stream of the second processing fluid toward the workpiece to rinse the workpiece.

Therefore, it would have been obvious to one of ordinary skill in the art to have modified the system of Woodruff et al and Keigler et al to include a nozzle as taught by Reid et al for the purpose of providing rinsing of the workpiece quickly after it has been removed from the electroplating fluid.

8. Claims 13-14, 17 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodruff et al (US 2001/0032788) in view of Keigler et al (US 2005/0167275) as applied above to claims 1, 3-5, 10-12 and 27-28 and further in view of Andricacos et al (US 5,312,532).

Woodruff et al in view of Keigler et al fail to teach a magnet as claimed. The electrode support was removable from the system.

Andricacos et al teach (see figure 2a and col. 5, lines 38-64) including a permanent magnet in association with an electroplating cell for the purpose of providing an axis-orienting magnetic field to orient the electroplated material.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a permanent magnet to the apparatus of Woodruff et al as taught by Andricacos et al for imparting a desired orientation to the electroplated material.

Regarding claim 17, Keigler et al teach (as above) a paddle device as claimed.

Allowable Subject Matter

9. Claim 21 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claim 40 is allowed.

11. The following is a statement of reasons for the indication of allowable subject matter: the subject matter of these claims are deemed to structurally distinguish the claimed invention from the teachings of the prior art.

Terminal Disclaimer

12. The terminal disclaimers filed on 8 June 2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent Application Nos. 10/733,807 and 10/734,098 have been reviewed and are accepted. The terminal disclaimers have been recorded.

Response to Arguments

13. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

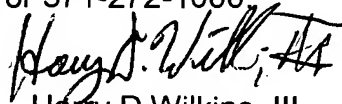
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 7:45am-4:15pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Harry D Wilkins, III
Primary Examiner
Art Unit 1753

hdw